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ELECTROTECHNICAL VOCABULARY

PART 50 TELECONTROL

(First Revision)

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Indian Standard

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PART 50 TELECONTROL

(First Revision)

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ELECTROTECHNICAL VOCABULARY

PART 50 TELECONTROL

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part 50) (First Revision) was adopted by the Indian Standards Institution on 28 March 1985, after the draft finalized by the Basic Standards on Electronics and Telecommunication Sectional Committee in consultation with the Power Line Carrier Systems and Associated Telecontrol Equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 With the standardization work on telecontrol equipment having been taken up, need for uniform definitions of terms relating to telecontrol has been felt. To ensure this objective as well as to avoid repetition of these terms in individual standards, this standard has been prepared.

0.3 This standard was originally published in 1978 based on IEC Doc: 1 (IEV 371) (Central Office) 1084 which has subsequently been superseded by Doc: 1 (IEV 371) (Central Office) 1143 and 1143A. This revision has therefore been taken up to line up this standard with the latest IEC documents on vocabulary for telecontrol, namely Doc: 1143 and 1143 A.

0.4 This standard is one of a series of Indian Standards on Electrotechnical vocabulary. A list of standards published so far in this series related to electronics and telecommunication is given on pages 16-17.

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1. SCOPE

1.1 This standard (Part 50) covers definitions of terms relating to telecontrol. The terms are broadly classified under the following heads:

a) General terms;
b) Types of monitored information;
c) Types of command information;

d) Internal functions and information for the system;
e) Processing of information;
f) Telecontrol stations, networks and configurations;
g) Telecontrol transmission techniqnes; and
h) Characteristics.

2. GENERAL TERMS

2.1 Telecontrol — The control of operational equipment at a distance using the transmission of information by telecommunication techniques.

NOTE — Telecontrol may comprise any combination of command, alarm, indication, metering, protection and tripping facilities, without any use of speech messages.

2.2 Telemonitoring — The supervision of the status of operational equipment at a distance using telecommunication techniques.

2.3 Telemetering — The transmission of the values of measured variables using telecommunication techniques.

2.4 Teleindication; Telesignalisation (Deprecated) — The telemonitoring of status information such as alarm conditions, or switch positions, or valve positions.

2.5 Telecounting; Transmission of Integrated Total — The transmission of the values of measurable quantities which are integrated over a specified parameter, such as time, using telecommunication techniques.

NOTE — The integration may take place before or after transmission. If integration takes place before transmission the expression transmission of integrated totals is used.

2.6 Telecommand — The causing of a change in the status of operational equipment by telecommunication techniques.

2.7 Teleswitching — The telecommand of operational equipment having two determined states.

NOTE — Some equipments can only be controlled to one of their two determined states, for example, resetting of tripping relays.

2.8 Teleadjusting — The telecommand of operational equipment having more than two states.

NOTE — Teleadjusting may be achieved by repetitive single or double commands or transmission of setpoint commands.

2.9 Teleinstruction — The transmission, using telecommunication techniques, of switching and/or adjusting instructions to a station for manual operation.

NOTE — Teleinstructions are usually presented by visual means.

2.10 Teleregulation — The combination of telemonitoring and telecommand facilities in a closed loop, generally including an automatic decision making part.

3. TYPES OF MONITORED INFORMATION

3.1 Monitored Information (in Telecontrol) — Information characterising the state or the change in state of an equipment in a monitored station and which is transmitted to a monitoring station.

3.2 State Information — Monitored information on a characteristic condition of an operational equipment. Characteristic conditions can assume 1 out of "n" possibilities where n $\geqslant 2$.

3.3 Binary State Information — Monitored information of the status of operational equipment which is characterised by one or several on/off states.

3.4 Event Information — Monitored information on the change of state of an operational equipment.

3.5 Return Information (in Telecontrol) — Monitored information indicating that a command has been executed or aborted.

3.6 Incremental Information — Monitored information on the alteration of a value by one or more units.

NOTE — Sometimes this alteration may be only in one direction, for example, for counting purposes. In other cases the alteration may be in two directions, for example, higher/lower, forward/backward, left/right, etc.

3.7 Single-Point Information — Monitored information represented by only one bit characterising two determined states of an operational equipment.

3.8 Double-Point Information — Monitored information represented by two bits characterising two determined states and two indeterminate states of an operational equipment.

Example:

10 represent
01 determined states
00 represent
11 indeterminate states

3.9 Intermediate State Information — Monitored information on an interminate state of an operational equipment which may last a specified time.

Example:

The state of a slow-moving disconnector whilst in transit.

3.10 Faulty State Information — Monitored information characterising an indeterminate state of operational equipment which state lasts longer than a specified time.

3.11 Fleeting Information; Transient Information — Monitored information on a condition that may persist for a time which is so short that reliable detection and transmission requires storage in the input facility of the telecontrol equipment.

3.12 Persistent Information — Monitored information which persists long enough to be reliably detected and transmitted without storing in the input facility of the telecontrol equipment.

3.13 Group Alarm — The combination of several individual alarms into one alarm.

3.14 Common Alarm — The combination of all individual alarms into one alarm.

4. TYPES OF COMMAND INFORMATION

4.1 Command (in Telecontrol) — Information in order to cause a change of state of an operational equipment.

4.2 Single Command — A command to cause a change of state of an operational equipment in one direction.

4.3 Double Command — A pair of commands each of which is used to cause the change of operational equipment to one of two determined states.

4.4 Pulse Command — A command in which the output signal to an operational equipment is a single pulse of predetermined duration independent of the duration of the initiating signal.

4.5 Maintained Command — A command in which the output signal to an operational equipment is maintained until the change of state is executed or until the end of a predetermined delay longer than the response of the slowest operational equipment.

NOTE — The duration of the output signal is independent of the duration of the initiating signal.

4.6 Persistent Command — A command in which the output signal to an operational equipment persists for as long as the initiating signal is present.

4.7 Starting Command — A command which initiates action of operational equipment.

4.8 Stop Command — A command which stops action of operational equipment.

4.9 Switching Command — A command to change the state of two-state operational equipment from one state to the other state.

Examples:

"Switch-on/Switch-off"; "Open/Close".

4.10 Adjusting Command — A command to change the state of an operational equipment having more than two states.

4.11 Set Point Command — A command in which the value for the required state of an operational equipment is transmitted to a controlled station where it is stored.

4.12 Persistent Regulating Command — A persistent command which during the time of execution causes continual change to a parameter.

4.13 Regulating Step Command; Incremental Command; Step by Step Adjusting Command — A pulse command which changes the state of an operational equipment in predetermined steps.

NOTE — It is usual to have two distinct commands to adjust an operational equipment in its two possible directions.

4.14 Selection Command — A command to connect one of several parts of an installation to a common equipment.

Example:

The selection of one measured at a time to a common display device.

4.15 Group Command — A command which is addressed to several operational equipments at one outstation.

4.16 Broadcast Command — A command which is addressed to operational equipments at several or all outstations of a telecontrol network.

4.17 Instruction Command; Standard Command — A command which is input at a control centre and which indicates a standard instruction to operators in the control room of a manned station.

Examples:

"Start generators" or "Adjust generator output to .... MW".

NOTE — The instruction command is distinguished from instructions transmitted by general communication means (for example, teleprinter) in that it is input and transmitted by means of devices used in telecontrol systems for other purposes and therefore shall be programmed in a similar manner to other types of commands.

4.18 Function Command — Command which initiates the operation of an automatic sequencing device in order to achieve the required function.

Example:

The command to change busbars for a feeder.

4.19 Select and Execute Command — A command whereby two successive actions are required to effect a change of state of an operational equipment; the first or "select command" energises part of the control circuit which in turn causes confirmatory return information to be transmitted back; the second or "execute command" causing the full energization of the control circuit at the receiving station is transmitted only after receipt of this return information.

5. INTERNAL FUNCTIONS AND INFORMATION FOR THE SYSTEM

5.1 Positive Acknowledgement — A message indicating that monitoring or command information has been received correctly.

5.2 Negative Acknowledgement — A message indicating that monitoring or command informaton has been received incorrectly.

5.3 Change of State Announcement — An announcement of a demand for the transmission of event information.

NOTE — This information element corresponds to the 'interrupt' signal in local control systems.

5.4 Interrogation Command — A command by which one or more outstations are requested to transmit information.

5.5 General Interrogation Command — An interrogation command requesting all outstations to transmit all their monitored information to their control centre.

5.6 Station Interrogation Command — An interrogation command by which one outstation is requested to transmit all monitored information to its control centre.

5.7 Selective Interrogation Command — An interrogation command by which one outstation is requested to transmit the state information of one or more operational equipment.

5.8 Check Command — A command for the purpose of ensuring that the telecontrol equipment is functioning correctly.

5.9 Transmission Error Alarm — Information indicating that an erroneous transmission signal has been detected.

5.10 Equipment Failure Information — Information indicating failure of telecontrol equipment.

5.11 Signal Quality Detection — A measurement of the degradation in quality of the received signal, used for error control purposes.

Examples:

Signal to noise ratio falling below a given threshold. Pulse length exceeding a specified value.

6. PROCESSING OF INFORMATION

6.1 Separating Capacity (in Telecontrol); Discrimination (in Telecontrol) — The minimum time by which events shall be separated such that the sequence of their occurrence is determined correctly.

6.2 Absolute Chronology; Time Tagging — Method of transmission of changes-of-state so that information from a location is transmitted accompanied by data giving the registered time at which the changes occurred, within the time resolution.

6.3 Time Resolution; Limit of Accuracy of Chronology — The minimum time by which events shall be separated in order that the corresponding time tags be different.

NOTE — The time resolution cannot be shorter than the separating capability.

6.4 Centralised Absolute Chronology — Transmission of changes of state information with absolute chronology from different locations containing synchronised clocks.

NOTE — The resulting accuracy specification has to consider separating capability, absolute chronology, and clock synchronisation errors.

7. TELECONTROL STATIONS NETWORKS AND CONFIGURATIONS

7.1 Master Station (in Telecontrol) — A location at which telecontrol of outstations is performed.

7.2 Submaster Station; Concentrator Station — A station in a hierarchical telecontrol network at which the monitored information coming from outstations is concentrated for transmission to the master station and at which the command information is distributed to the outstations.

7.3 Transit Station — An intermediate station through which messages or signals are switched.

7.4 Outstation; Controlled Station; Remote Station — A station which is monitored or commanded and monitored by a master station.

7.5 Telecontrol Configuration — The combination of telecontrol stations and transmission links by which these stations are connected.

7.6 Point-to-Point Configuration — A configuration whereby one station is connected to another station by a dedicated transmission link.

7.7 Multiple Point-to-Point Configuration – A configuration whereby the control centre or master station is connected to more than one outstation in such a way that simultaneous data exchange is possible between the master station and every outstation.

7.8 Multipoint-Star Configuration — A configuration whereby the control centre or master station is connected to more than one outstation in such a way that at any time only one outstation may transmit data to the master station; the master station may transmit data either to one or more selected outstations or global messages to all outstations simultaneously.

7.9 Multipoint-Partyline Configuration — A configuration whereby the control centre or master station is connected to more than one outstation by a common link in such a way that at any time only one outstation may transmit data to the master station; the master station may transmit data either to one or more selected outstations or global messages to all outstations simultaneously.

7.10 Multipoint-Ring Configuration — A configuration whereby the communication link among all stations forms a ring; the control center or master station may communicate with each outstation using two different routes.

7.11 Omnibus Configuration — A telecontrol configuration in which any one of several stations may communicate with any other.

7.12 Hybrid Configuration (in Telecontrol); Composite Configuration (in Telecontrol) — A combination of several telecontrol configurations, such as multipoint-star and multipoint-partyline configurations.

8. TELECONTROL TRANSMISSION TECHNIQUES

8.1 Cyclic Transmission (in Telecontrol) — A transmission method where the message sources are scanned and messages are transmitted cyclically according to a definite sequence.

8.2 Spontaneous Transmission — A transmission method where messages are transmitted only when an event occurs at the sending station.

8.3 Transmission on Demand — A transmission method in which transmission is effected as result of a request such as an interrogation command from a control centre or master station.

8.4 Transmission with Decision Feedback — A transmission method in which the receiving station transmits positive or negative acknowledgement to the initiating station.

8.5 Transmission with Information Feedback — A transmission method in which the receiving station retransmits the complete information to the initiating station where it is compared to verify that the information content is the same as orginally transmitted.

8.6 Synchronous Telecontrol Transmission — A telecontrol transmission method which uses isochronous signals separated by time intervals whose durations are multiples of a unit time interval and in which telecontrol equipments are operating continuously at substantially the same rate.

8.7 Start-Stop Telecontrol Transmission; Asynchronous Telecontrol Transmission — A telecontrol transmission method which uses a sequence of isochronous signals within coherent frames which are separated by time intervals of arbitrary durations.

8.8 Quiescent Telecontrol System — A telecontrol transmission method in which equipment is normally alert but inactive and where information is transmitted only upon events.

8.9 Polling System; Scanning System; Interrogative Telecontrol System — A telecontrol system in which the monitored information is obtained upon request from the control centre or master station to outstations.

8.10 Channel Selecting System; Common Diagram System — A telecontrol system in which the control centre or master station selects any one of a number of outstations by means of switching the receiver and if necessary the command sender from one circuit to another.

8.11 Digital Pulse Duration Modulation (DPIM) — A modulation in which the binary signal elements "O" and "I" are represented by a different duration of a pulse and/or a pulse interval.

NOTE — The ratio between the long and the short signal element duration, which depends on requirements of reliability and speed of the message transmission, is not necessarily an integer.

9. CHARACTERISTICS

9.1 Bit Error Rate (in Telecontrol) — The ratio of the number of bits received inverted to the total number of bits sent.

9.2 Bit Error Probability (in Telecontrol) — The probability that a received bit be inverted with respect to the corresponding bit sent.

9.3 Block Error Rate (in Telecontrol) — The ratio of the number of blocks incorrectly received to the total number of blocks sent.

9.4 Block Error Probability (in Telecontrol) — The probability that a block be incorrectly received.

9.5 Residual Error Rate (in Telecontrol) — The ratio of the number of undetected wrong messages to the total number of messages sent.

9.6 Residual Error Probability (in Telecontrol) — The probability that a received wrong message be undetected.

9.7 Rate of Information Loss (in Telecontrol) — The ratio of the number of lost messages to the total number of messages sent.

9.8 Probability of Information Loss (in Telecontrol) — The probability that a message be lost.

9.9 Rate of Residual Information Loss (in Telecontrol) — The ratio of the number of undetected lost messages to the total number of messages sent.

9.10 Probability of Residual Information Loss (in Telecontrol) — The probability that the loss of a message be undetected.

9.11 Information Transfer Rate (in Telecontrol) — The average number of bits of information per second transferred from a data source and accepted as valid by a data sink.

9.12 Information Transfer Efficiency (in Telecontrol) — The ratio of the information content of a message transferred from a data source and accepted as valid by a data sink to the total number of bits expended for the message transfer.

9.13 Information Capacity (in Telecontrol) — The amount of different information in a telecontrol system that may be handled at the control centre or master station and at the outstations.

NOTE 1 — The information capacity is often expressed by the number of commands and by the amount of monitored information which may be handled.

NOTE 2 — The information capacity of a telecontrol equipment at the control centre or master station may be shared between several outstations.

9.14 Overall Response Time (in Telecontrol) — The time interval between the initiating command in a sending station and the output of the associated response (coming from a receiving station) in the same initiating station.

9.15 Overall Transfer Time (in Telecontrol) — The time duration by which information is delayed after the actual event in the sending station and until presentation at the receiving station.

NOTE — This time includes the delays due to the input peripheral device in the sending station and the corresponding peripheral output device at the receiving station.

9.16 Telecontrol Transfer Time — The time duration from the input signal from the peripheral equipment to the telecontrol equipment at the sending station to the output signal from the telecontrol equipment to its peripheral equipment at the receiving station.

NOTE — Transfer time includes time delay for signal conversion, coding, etc, . . . in the telecontrol transmitter, signal delay on the transmission channel and time delay for reconversion, decoding, checking, etc . . . . , in the telecontrol receiver. However, it does not include the response time of peripheral input and output devices, such as interposing relays, signal lamps, transducers, indicating instruments, etc . . .

9.17 Maximum Transfer Time (in Telecontrol) — The transfer time for the case in which the primary signal to the telecontrol transmitter is input at the most unfavourable moment with respect to the telecontrol system.

NOTE — The maximum transfer time may occur within a cyclic system if an information is input just after scanning the corresponding input element or within a quiescent system if information is input just after the start of transmission of another signal block.

9.18 Average Transfer Time (in Telecontrol) — The average of the transfer times in all cases of input of the primary signal to the telecontrol transmitter.

9.19 Cyclic Time (in Telecontrol) — The time interval between successive appearances of any information that is transmitted periodically.

9.20 Updating Time Refreshment Time (in Telecontrol) — The time between a change of state in an outstation and its registration in the control centre or master station.

NOTE — In cyclic systems, the average updating time is equal to one half of the cycle time plus the overall response time.

9.21 Start Time (in Telecontrol) — The time taken for a telecontrol system to become fully operational after switching-on.

9.22 Restart Time (in Telecontrol) — The time taken for a telecontrol system to become fully operational after a loss of supply.

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INDIAN STANDARDS ON ELECTROTECHNICAL VOCABULARY

IS:

- 1885 Electrotechnical vocabulary:
  - (Part 3/Sec 1)-1965 Acoustics, Section 1 Physical acoustics
  - (Part 3/Sec 2)-1966 Acoustics, Section 2 Acoustical and electro-acoustical systems
  - (Part 3/Sec 4)-1966 Acoustics, Section 4 Sonics, ultrasonics and underwater acoustics
  - (Part 3/Sec 5)-1966 Acoustics, Section 5 Speech and hearing
  - (Part 3/Sec 6)-1967 Acoustics, Section 6 Acoustical instruments
  - (Part 3/Sec 7)-1978 Acoustics, Section 7 Music
  - (Part 3/Sec 8)-1974 Acoustics, Section 8 Architectural acoustics
  - (Part 4/Sec 1)-1973 Electron tubes, Section 1 Common terms (*first revision*)
  - (Part 4/Sec 2)-1973 Electron tubes, Section 2 X-ray tubes (*first revision*)
  - (Part 4/Sec 3)-1970 Electron tubes, Section 3 Microwave tubes
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  - (Part 4/Sec 5)-1972 Electron tubes, Section 5 Pulse terms
  - (Part 4/Sec 6)-1972 Electron tubes, Section 6 Noise in Microwave tubes
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  - (Part 7/Sec 3)-1970 Semiconductor devices, Section 3 Transisters
  - (Part 7/Sec 4)-1969 Semiconductor devices, Section 4 Thyristors
  - (Part 7/Sec 5)-1971 Semiconductor devices, Section 5 Integrated circuits and micro-electronics
  - (Part 12)-1966 Ferrimagnetic oxide materials
  - (Part 18)-1967 General terms on radio communications
  - (Part 19)-1967 Radio communication circuits
  - (Part 20)-1967 Radio wave propagation
  - (Part 21)-1967 Aerials
  - (Part 22)-1967 Equipment for radio communications, transmitting and receiving
  - (Part 23)-1967 Radio telegraphy and mobile radio
  - (Part 24)-1967 Broadcasting, sound and television
  - (Part 25)-1967 Radio location and radio-navigation
  - (Part 26)-1968 Telecommunication relays
  - (Part 31)-1971 Magnetism
  - (Part 36)-1972 Radio interference

1885 Electrotechnical vocabulary — *Contd.*

(Part 39)-1979 Reliability of electronic and electrical items (*first revision*)

(Part 40)-1974 Connectors

(Part 41)-1975 Non-reciprocal electromagnetic components

(Part 44)-1978 Piezoelectric devices [*superseding* IS : 1885 (Part 5)-1965 *and* IS : 1885 (Part 33)-1972]

(Part 45)-1977 Capacitors

(Part 46)-1977 Resistors

(Part 47)-1977 Digital electronic equipment

(Part 48/Sec 1)-1978 Recording, Section 1 Tape recording [*superseding* IS : 1885 (Part 3/Sec 3)-1967]

(Part 48/Sec 2)-1972 Recording, Section 2 Disk recording [*superseding* IS : 1885 (Part 3/Sec 3)-1967]

(Part 50)-1985 Telecontrol (*first revision*)

(Part 52/Sec 1)-1981 Data processing, Section 1 Fundamental terms

(Part 52/Sec 2)-1981 Data processing, Section 2 Arithmetic and logic operations

(Part 52/Sec 3)-1981 Data processing, Section 3 Equipment technology selected terms

(Part 52/Sec 4)-1981 Data processing, Section 4 Organization of data

(Part 52/Sec 5)-1981 Data processing, Section 5 Representation of data

(Part 52/See 6)-1981 Data processing, Section 6 Preparation and handling of data

(Part 52/Sec 7)-1981 Data processing, Section 7 Digital computer programming

(Part 52/Sec 8)-1981 Data processing, Section 8 Control, input-output and arithmetic equipment

(Part 52/Sec 9)-1981 Data processing, Section 9 Data media, storage and related equipment

(Part 52/Sec 10)-1981 Data processing, Section 10 Data communication

(Part 52/Sec 11)-1981 Data processing, Section 11 Operating techniques and facilities

(Part 52/Sec 12)-1981 Data processing, Section 12 Information theory

(Part 52/Sec 13)-1981 Data processing, Section 13 Analogue computing

(Part 56)-1981 Microwave components and accessories [*superseding* IS : 1885 (Part 13/Sec 1)-1968 *and* IS : 1885 (Part 13/Sec 2)-1967]

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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